Chapter 5 Consciousness

Introduction to Psychology (York University)

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Chapter 5: Variations in Consciousness

The Nature of Consciousness

- Consciousness is the awareness of internal and external stimuli.
- Descartes saw the mind as being dissociated from but connected to the body.
- William James emphasized that consciousness is a continually changing stream of mental activity. Even when we are sleep, our consciousness moves through a series of transitions.
- Consciousness = personal awareness
- *Controlled processes* are those over which we have intentional control while *automatic processes* occur without our intention.

Variations in Awareness and Control

- **Mind wandering:** Thoughts that are not related to what a person is intentionally trying to do at a given moment.

Unconscious Thought Effects

- Dijksterhuis claims that decisions made under condition when individuals do not have the opportunity to engage in conscious thought may sometimes be more accurate.
- Conscious thought is constrained by capacity limitations such that you often consider only a small subset of the relevant information when making a decision; unconscious thought does not have the same capacity constraints. Unconscious thought meaning that you don't actually take the time to consciously reflect on the issue at hand.
- "Conscious thought is thought with attention; unconscious thought is thought without attention (or with attention directed elsewhere)."

Consciousness and Brain Activity

- Consciousness arises from activity in distributed networks of neural pathways.
- The **electroencephalograph (EEG)** is used to indicate variations in consciousness. It monitors the electrical activity of the brain over time by means of recording electrodes attached to the surface of the scalp.
- The **electrooculograph** is used to determine eye movements during REM sleep.
- Brain waves vary in amplitude and frequency (cps) and are divided into four bands.

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- When we are alertly engaged in problem solving or normally walking or thinking, beta waves tend to dominate (13-24 cps).
- When we are relaxed, alpha waves increase (8-12 cps)
- There are also theta waves which dominate during light sleep (4-7 cps)
- Delta waves are present during deep sleep (< 4cps)
- The less cps means more relaxedness.

Biological Rhythms and Sleep

- **Biological rhythms:** Periodic fluctuations in physiological functioning.
  - Organisms have internal "biological clocks" that somehow monitor the passage of time.

The Role of Circadian Rhythms

- **Circadian rhythms:** The 24-hour biological cycles found in humans and many other species.
- Particularly influence the regulation of sleep.
- Alertness, core body temperature, blood pressure and other aspects of cognitive performance typically fluctuate in a 24-hour rhythm (in the absence of 24-hour clues).

Ignoring Circadian Rhythms

- Getting out of sync with your circadian rhythm causes a jet lag.

The Sleep and Waking Cycle

- In fact, we do actually experience a quite bit of physical and mental activity when we sleep; our brain is not "shut down".
- Researchers in a sleep laboratory can observe subjects while using elaborate equipment to record physiological changes during sleep.

Cycling through the Stages of Sleep

- During sleep, people cycle through a series of five stages.
  - Stage 1 → Brief transitional stage of light sleep (1-7 minutes). Theta waves prominent.
  - Generally, as people move from an awake state through deeper stages of sleep, their brain waves decrease in frequency (cycles per second – cps) and increase in amplitude.

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- In stages 3 and 4, there are progressively more delta waves.
- The cycle then reverses itself and the sleeper gradually moves back upward the lighter stages.

REM Sleep:

- When sleepers reach back to stage 1, this is considered going into the fifth stage of sleep, known as **REM sleep** (rapid eye movements).
- Stage of vivid dreaming (you can dream in other stages as well).
- REM sleep was discovered by William Dement.
- Although REM is a relatively deep stage of sleep, EEG activity is dominated by high-frequency beta waves that resemble those observed when people are alert and awake.

- During the course of a night, people usually repeat the cycle about four times. As the night progresses, REM sleep dominates as non-REM sleep periods become shorter.

Age Trends in Sleep

- Total sleep and slow-wave sleep (stages 3 and 4) continue to decline gradually with age.

The Neural and Evolutionary Bases of Sleep

- One brain structure that is important to sleep and wakefulness is the reticular formation in the core of the brainstem.
- The **ascending reticular activating system (ARAS**) consists of the afferent fibres running through the reticular formation that influence physiological arousal. The ARAS conveys neural stimulation to many areas of the cortex and contributes in regulating sleep and waking.

Sleep Deprivation

- The metabolism in the prefrontal and parietal associational areas of the brain decrease in individual deprived of sleep for 24 hours.
- There areas of the brain are important for judgement, control, attention, and visual association.

REM Deprivation Study

- Subjects were awakened over a period of nights whenever they began to go into the REM stage. As the nights went by, the subjects shifted into the REM stage

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more and more frequently. Finally, when allowed to sleep without interruption, the subjects showed a "rebound effect" where they spent extra time in the REM period to make up for their REM deprivation.

- REM sleep appears to foster the process of **neurogenesis** – the formation of new neurons.
- This links the idea of REM sleep contributing to memory consolidation because neurogenesis contributes to learning.
- REM sleep serves many other positive functions as well such as creative insights.

Sleep Disorders

- **Insomnia:** 1/3 of adults report suffering from insomnia.
- **Narcolepsy:** Falling asleep uncontrollably or during normal waking periods.
- **Sleep apnea:** Frequent reflexive gasping for air that awakens a person and disrupts sleep.
- **Nightmares:** Anxiety-arousing dreams that lead to awakening, usually from REM sleep.
- **Night terrors:** Abrupt awakening from non-REM sleep accompanies by intense automatic arousal and feeling of panic.
- **Somnambulism:** Sleepwalking. Occurs when certain parts of the brain appear to be awake while other parts show signs of being asleep.
- **REM sleep behaviour disorder (RBD):** Sleep disorder marked by potentially troublesome dream enactments during REM periods (ex. yelling during dream if being chased).
- **Lack of Dreams:** Parietal lobe injury.

- Whereas sleepwalking and night terrors are associated with slow-wave sleep, nightmares usually occur during REM sleep.

The World of Dreams

The Contents of Dreams

- The most common theme of dreams tends to be being chased. Other common themes are sex, falling, and school.

Links Between Dreams and Waking Life

- Freud noticed that contents of waking life often tended to spill into dreams; he labelled this spillover the *day residue*.

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- Sometimes the content of dreams can also be affected by stimuli experienced to the person while they are sleeping/dreaming. Dreamers that had water sprayed on their hand claimed, upon waking up, that water was incorporated into their dreams. This is the same as your alarm clock being incorporated as a loud engine or sirens and resulting in you to sleep through your alarm ringing.
- **Lucid dreaming:** When people realize they are dreaming while still in the dream state.

Theories of Dreaming

Theory 1: Sigmund Freud believed that the principle purpose of dreams is *wish fulfilment*. The day residue shapes dreams that satisfy unconscious needs. For example, an unsuccessful person might dream about dream accomplishments. The true meaning of your dream might be disguised.
- **Manifest content** consists of the plot of a dream at the surface level.
- **Latent content** refers to the hidden or disguised meaning of the events in the plot.

Theory 2: Cartwright emphasizes the problem-solving function of dreams.
- Dreams allow people to engage in creative thinking about problems dreams are not restrained from logic.

Theory 3: Hobson and McCarley assert that dreams are merely a by-product of periodic neural activation during REM sleep.
- Dreams are side effects of the neural activation that produces "wide-awake" brain waves during REM sleep.
- A story is created to make sense of internal signals.

Hypnosis: Altered Consciousness or Role Playing

* Refer to page 48

Hypnotic Induction and Susceptibility
- **Hypnosis:** A systematic procedure that typically increases suggestibility.
- Often, the hypnotist vividly describes bodily sensation that should be occurring.
- Responsiveness to hypnosis can be measured with the *Stanford Hypnotic Susceptibility Scale (SHSS)*.
- Research shows that people who are responsive to suggestion under hypnosis are just as responsive to suggestion without being hypnotized.

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Hypnotic Phenomena

- Many interesting effects can be produced through hypnosis:
- Anesthesia → Under the influence of hypnosis, some participants can withstand treatments that would normally cause considerable pain.
- Auditory or visual hallucinations
- Disinhibition

Theories of Hypnosis

- Hypnotized subjects don't actually seem to show reliable alternations in brain activity that are unique to hypnosis.
- The failure to find any physiological changes associated with hypnosis has led some theorists to conclude that hypnosis is a normal state of consciousness that is simply characterized by dramatic role playing. It is said to be the subjects' role expectations (subjects behaving as they think hypnotized people are supposed to) that produce the hypnotic effect, rather than a special trancelike state of consciousness. (Views of Theodore Barber)

Hypnosis as an Altered State of Consciousness

- The most influential explanation of hypnosis as an altered state of awareness has been offered by Ernest Hilgard. According to Hilgard, hypnosis creates dissociation in consciousness
- **Dissociation** is the splitting of consciousness into two streams.
    - One stream is in communication with the hypnotist and the external world, while the other is a difficult-to-detect "hidden observed".
    - For instance, a hypnotized subject might appear to be unresponsive to pain because the pain isn't registered in the portion of consciousness that communicates with other people.
    - Hilgard believes that divided consciousness is actually a quite common, normal experience in everyday life for example when driving a car and responding to traffic signals are other cars, with no recollection of having consciously done so.

Meditation: Pure Consciousness or Relaxation?

- **Meditation** refers to training attention to heighten awareness and bring mental processes under greater voluntary control.

Physiological Correlates

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- In the meditative state, your alpha waves and theta waves become more prominent.
- Heart rate, oxygen consumption, and carbon dioxide elimination seem to decline in the meditation state.

Long Term Benefits

- Reduce stress
- Enhanced immune response
- Increase pain tolerance
- Potential to modify brain structure

Altering Consciousness with Drugs

Principle Abused Drugs and Their Effects

- **Psychoactive drugs**: Chemical substances that modify mental, emotional, or behavioural functioning.

- Categories of psychoactive drugs we focus on in this chapter:
1) **Narcotics (opiates):** Drugs capable of relieving pain. Mimic the brains endorphins and endorphin receptor sites. For example, heroin.
2) **Sedatives:** Sleep-inducing drugs that tend to decrease the central nervous system activation and behavioural activity.
3) **Stimulants:** Drugs that tend to increase central nervous system activation and behavioural activity (range from caffeine to cocaine).
4) **Hallucinogens:** Cause distortions in sensory and perceptual experience.
5) **Cannabis:** The hemp plant from which marijuana, hashish, and THC are derived.
6) **Alcohol**
7) **MDMA (ecstasy)**

Factors Influencing Drug Effects

- The placebo effect may play a role.
- A drug's effect can change as the person's body develops a tolerance for the chemical as a result of continued use.

Mechanisms of Drug Action

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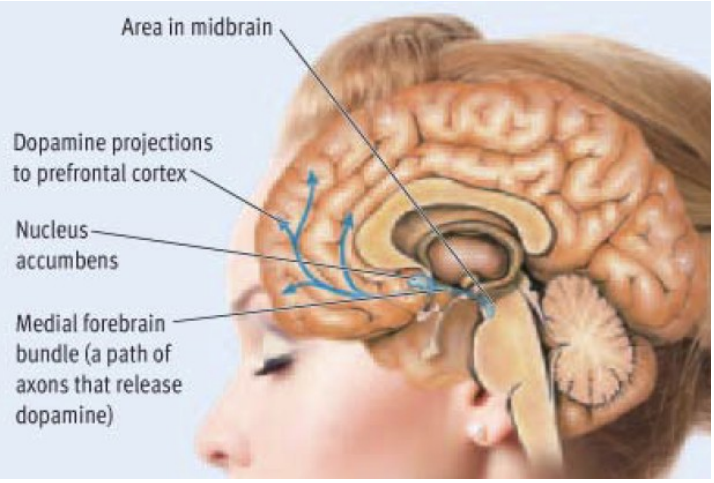
- Psychoactive drugs work primarily by altering neurotransmitter activity in the brain (neurotransmitters = chemicals that transmit information between neurons at junctions called synapses).
- The neural circuit shown in blue make up the *mesolimbic dopamine pathway*. Axons in this pathway run from an area in the midbrain through the medial forebrain bundle to the nucleus accumbens and on to the prefrontal cortex.


Area in midbrain
Dopamine projections to prefrontal cortex
Nucleus accumbens
Medial forebrain bundle (a path of axons that release dopamine)

- Recreational drugs affect a variety of neurotransmitter systems, but theorists believe that the heightened dopamine activity in this pathway is responsible for the reinforcing effects of most abused drugs.

Drug Dependence

- There is **physical dependence** and **psychological dependence** on drugs.
- Physical dependence is more severe and can use one to experience fevers, chills, or vomiting upon withdrawal of the drug.
- Dysregulation in the mesolimbic dopamine pathway appears to be the chief factor underlying drug craving and addiction.

Drugs and Health

- The three principal ways in which recreational drug use can affect health are by triggering an overdose, by producing various types of physiological damage (direct effects), and by causing health-impairing behaviour (indirect effects).

Lecture Slides

Visual Spatial Neglect:

- Caused by damage to the parietal lobe.
- Impairs ability to attend to the side of space that is opposite of the damaged hemisphere.
- The vision is normal, but the attention is impaired.
- For example, a patient only eats food from the same side of plate as damage.

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Isolation Studies:

- Siffre is the man that lived in a cave for 7 months without any 24-hour clues. He predicted that about 6 months passed by. Therefore, he mentally lost about 25 days!

- **Zeitgeber**: A cue given by the environment, such as a change in light or temperature, to reset the internal body clock.

Functions of Sleep:

- Restoration Theory (biological perspective) → The body wears out during the day and sleep is necessary to put it back in shape.
- Adaptive Theory (evolutionary perspective) → Sleep emerged in evolution to preserve energy and protect during the time of day when there is considerable danger.
- Consolidation of memory

Morning vs. Night People

- There are really 'morning' and 'night' people.
- Long gene = early riser
- Short gene = late riser

Nonsomniacs and Insomniacs:

- Nonsomniacs – sleep far less than most, but do not feel tired during the day.
- Insomniacs – have a normal desire for sleep but are unable to. Feel tired during the day.

Drugs:

- Drugs production, smuggling and distribution have exploded into sophisticated multinational business structure, estimated at $300-400 billion worldwide.
- Drug addicting affects 60 million alcoholics and compulsive smokers in USA, and another 5-6 million use illicit drugs.
- **Barbiturates:** Induce sleep but can cause dependence and, as a result, serious withdrawal symptoms.
- **Tranquilizers:** Relieve anxiety but can be addictive.

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